US009235711B1

(12) **United States Patent**
Xavier

(10) **Patent No.: US 9,235,711 B1**
(45) **Date of Patent: Jan. 12, 2016**

(54) **SYSTEMS, METHODS AND DEVICES FOR PROVIDING VISUAL PRIVACY TO MESSAGES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/313,361**

(22) Filed: **Jun. 24, 2014**

(51) **Int. Cl.**

G06F 21/10	(2013.01)
G06F 21/60	(2013.01)
G06T 5/00	(2006.01)
G06T 7/00	(2006.01)

(52) **U.S. Cl.**
CPC ***G06F 21/60*** (2013.01); ***G06T 5/003*** (2013.01); ***G06T 7/0081*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 21/10
See application file for complete search history.

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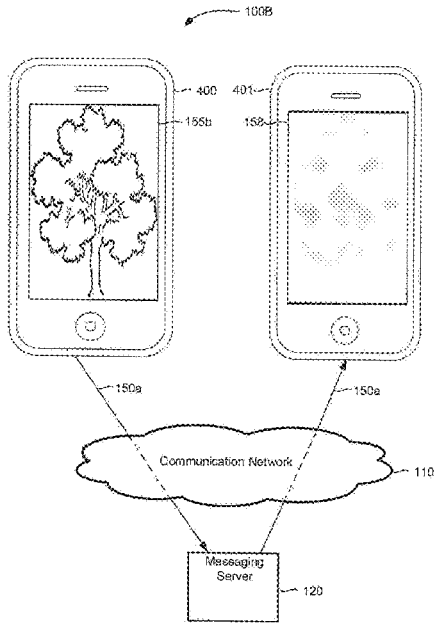
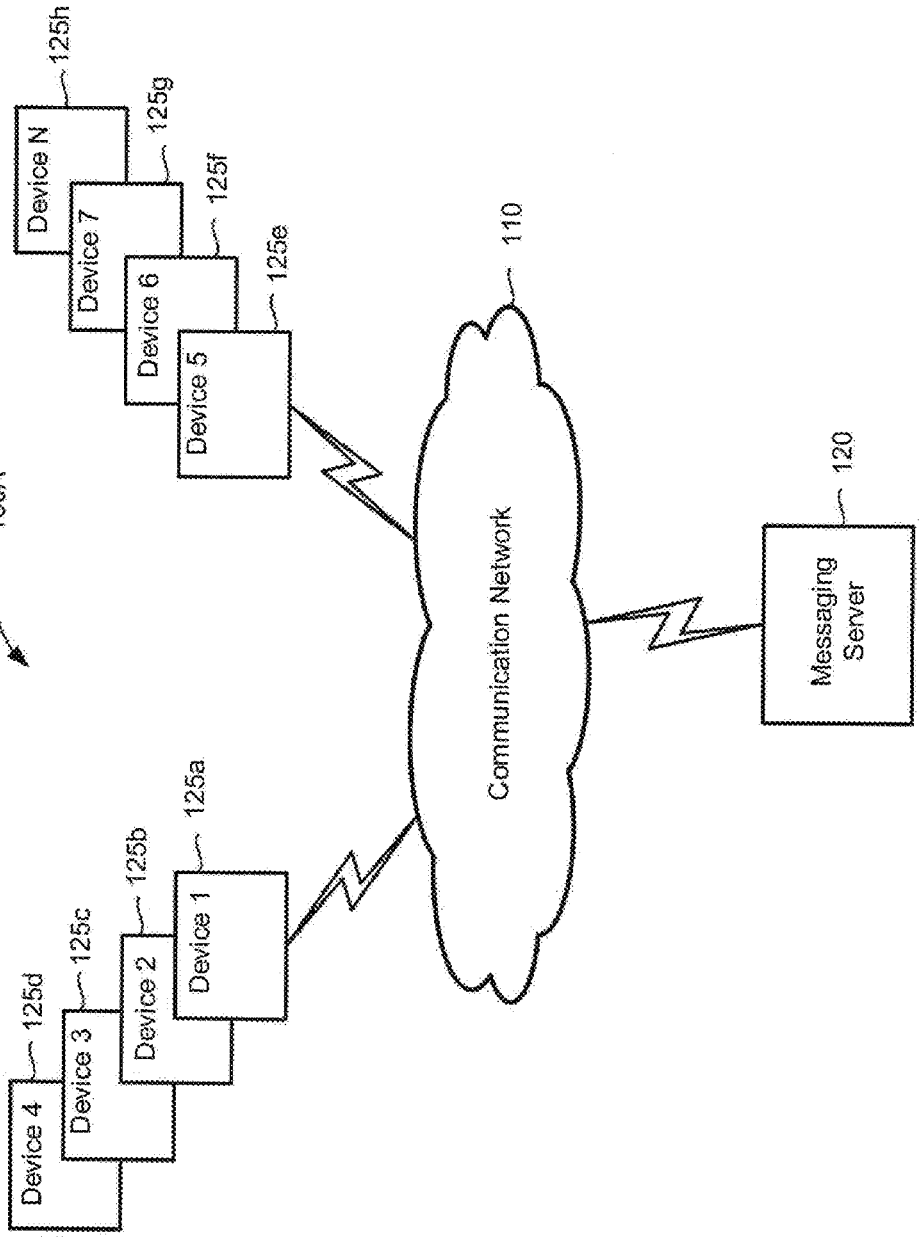
(57) **ABSTRACT**

At least one of the embodiments described herein relate generally to a method of providing visual privacy for a message sent to at least one device. The method may include the acts of: receiving the message at the at least one device, the message including content and a privacy indicator; converting the content to a content image; applying a blur function to the content image to generate a blurred content image; generating an obscured layer from the blurred content image; partitioning the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes; aligning the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

20 Claims, 16 Drawing Sheets

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Device 2
Device 3
Device 4
Device 5
Device 6
Device 7
Device N
125a
125b
125c
125d
125e
125f
125g
125h
110
Communication Network
120
Messaging Server

FIG. 1A

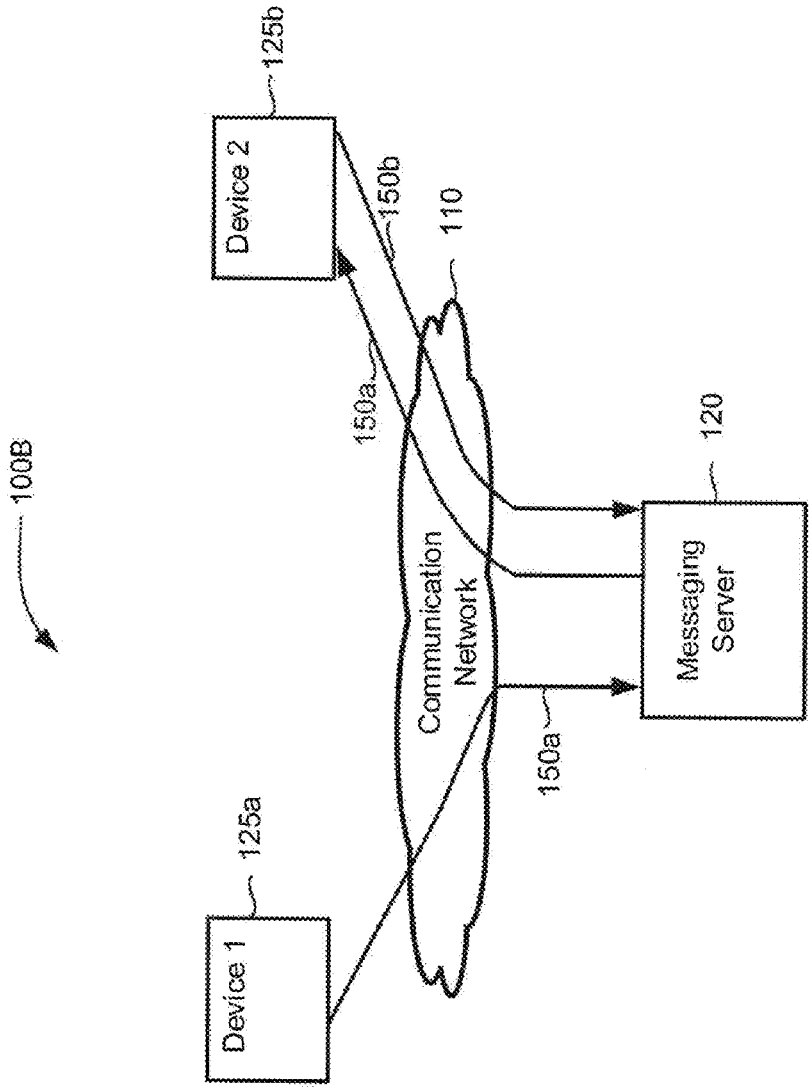

100B
Device 1
125a
Device 2
125b
150a
150b
110
Communication Network
150a
120
Messaging Server

FIG. 1B

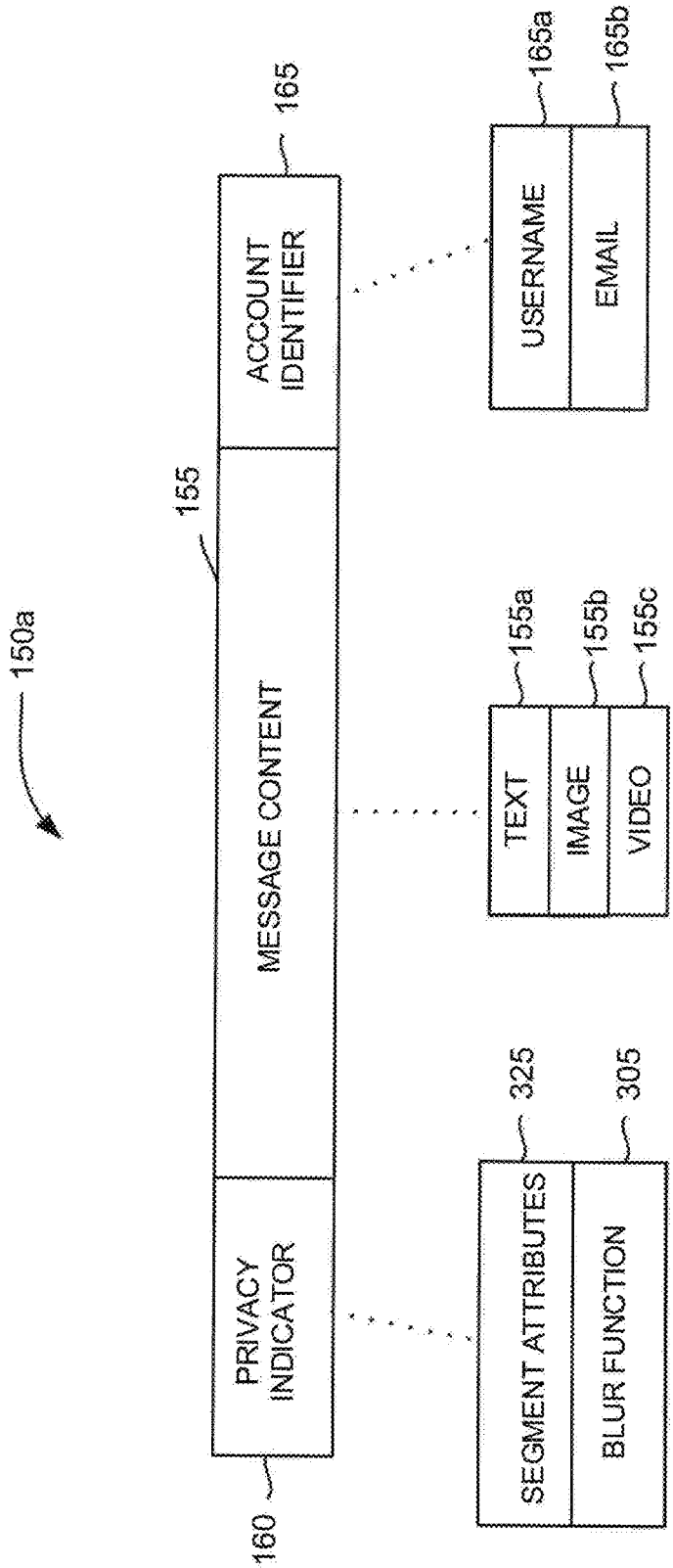
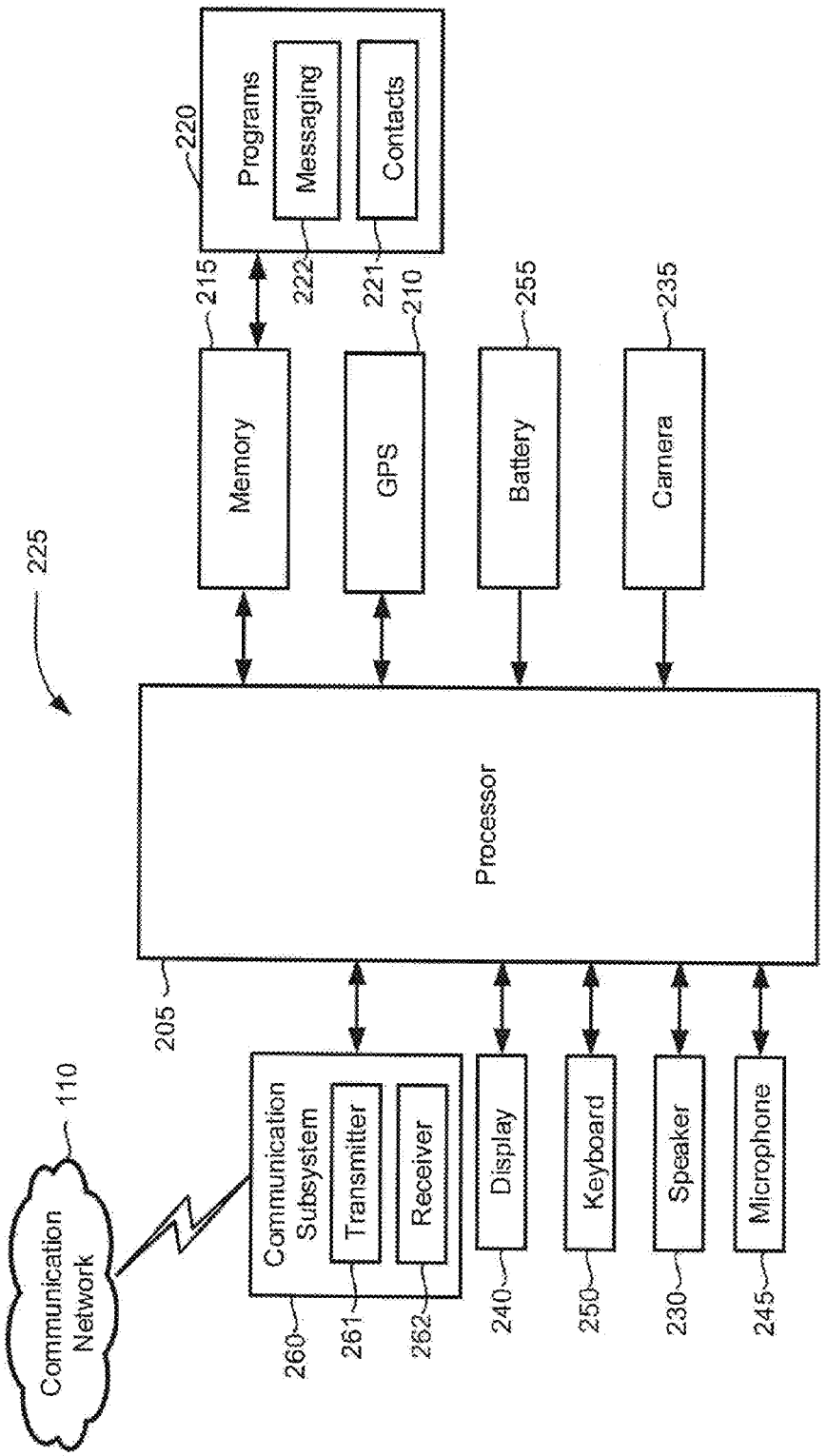

150a
155
MESSAGE CONTENT
ACCOUNT IDENTIFIER
165
USERNAME
EMAIL
165a
165b
TEXT
IMAGE
VIDEO
155a
155b
155c
PRIVACY INDICATOR
160
SEGMENT ATTRIBUTES
BLUR FUNCTION
325
305

FIG. 1C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220
Programs
Messaging
Contacts
215
222
221
210
255
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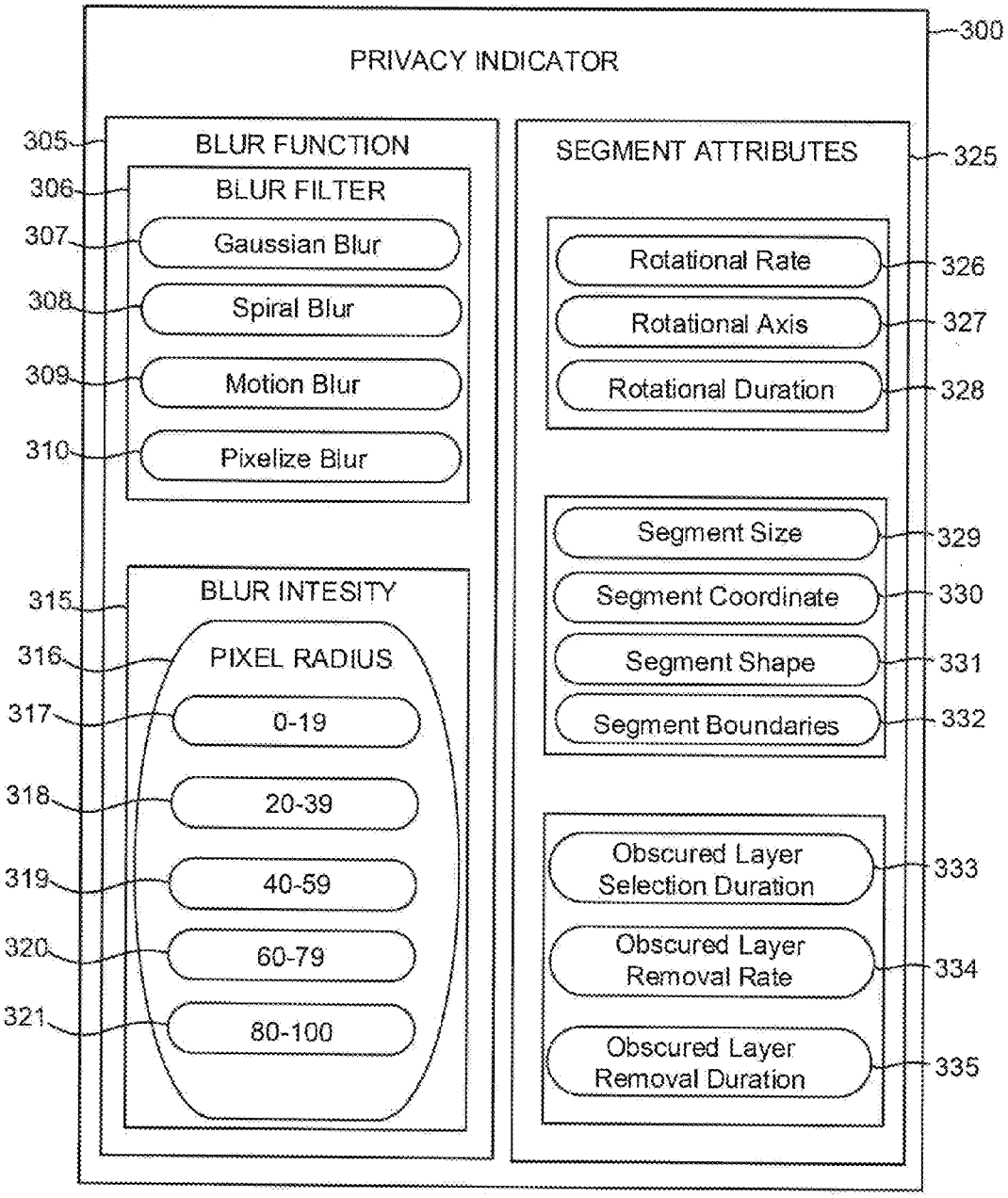
Memory
GPS
Battery
Camera
Processor
205
110
Communication Network
Communication Subsystem
Transmitter
Receiver
260
261
262
Display
Keyboard
Speaker
Microphone
240
250
230
245

FIG. 2


300
PRIVACY INDICATOR
305
BLUR FUNCTION
306
BLUR FILTER
307
Gaussian Blur
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Spiral Blur
309
Motion Blur
310
Pixelize Blur
315
BLUR INTESITY
316
PIXEL RADIUS
317
0-19
318
20-39
319
40-59
320
60-79
321
80-100
SEGMENT ATTRIBUTES
325
Rotational Rate
326
Rotational Axis
327
Rotational Duration
328
Segment Size
329
Segment Coordinate
330
Segment Shape
331
Segment Boundaries
332
Obscured Layer Selection Duration
333
Obscured Layer Removal Rate
334
Obscured Layer Removal Duration
335

FIG. 3

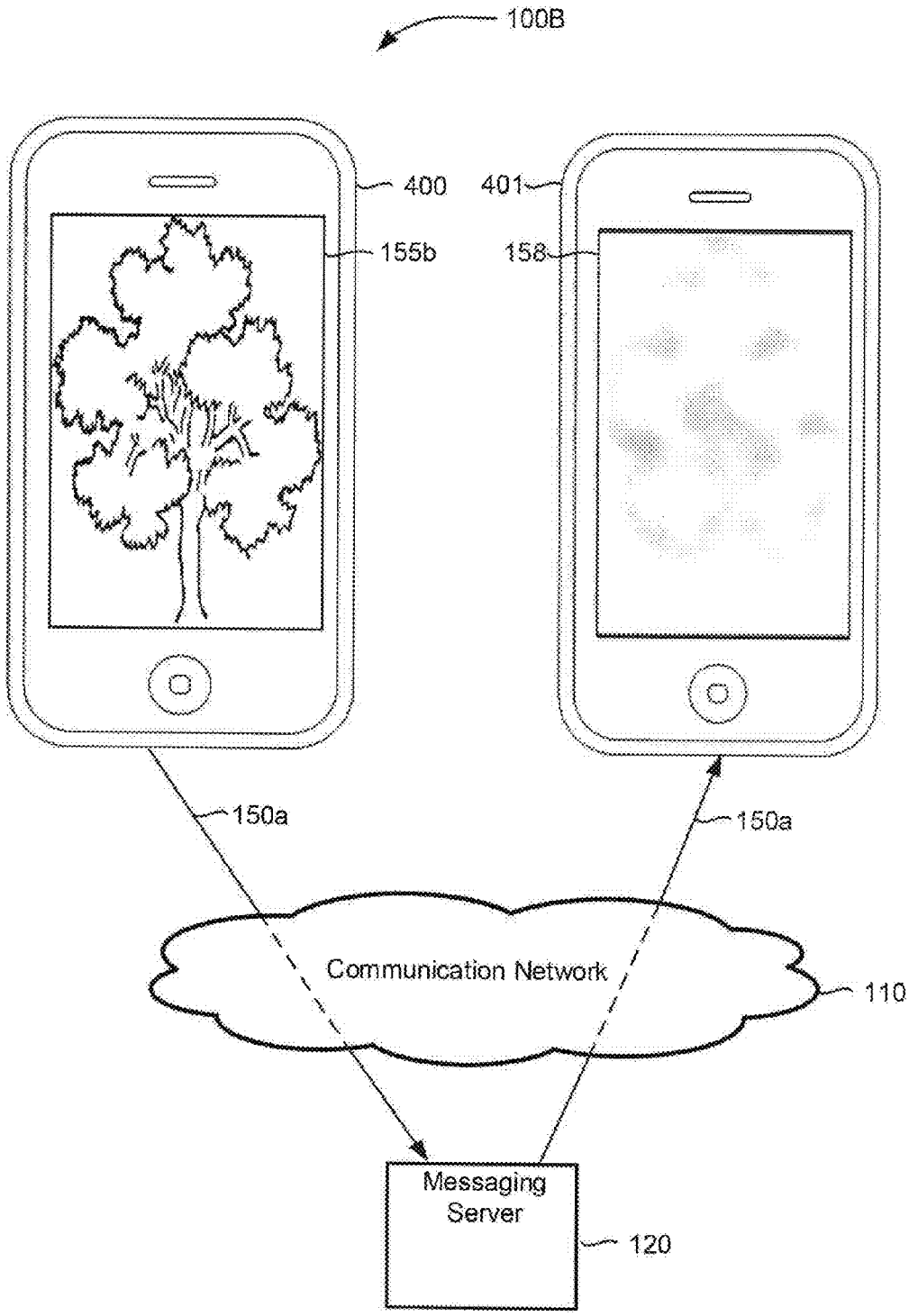
100B
400
401
155b
158
150a
150a
Communication Network
110
Messaging Server
120

FIG. 4

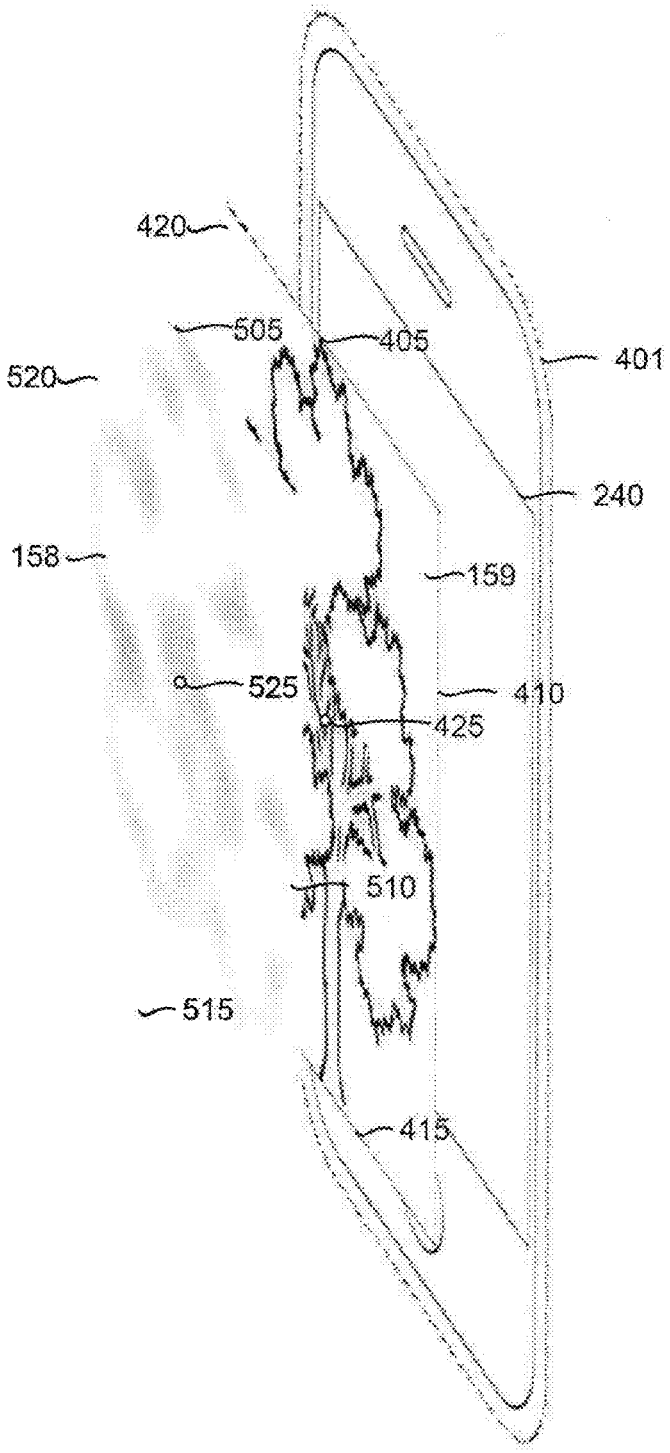

FIG. 5

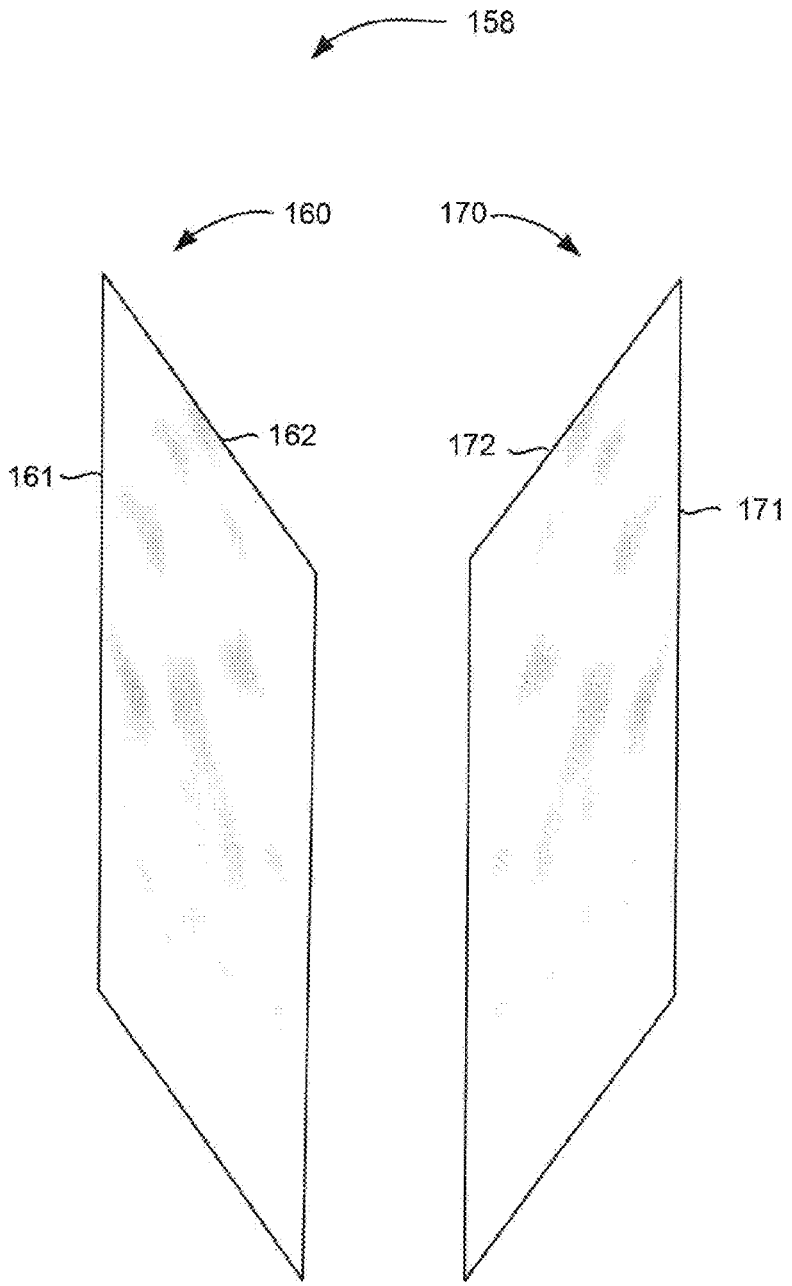

FIG. 6

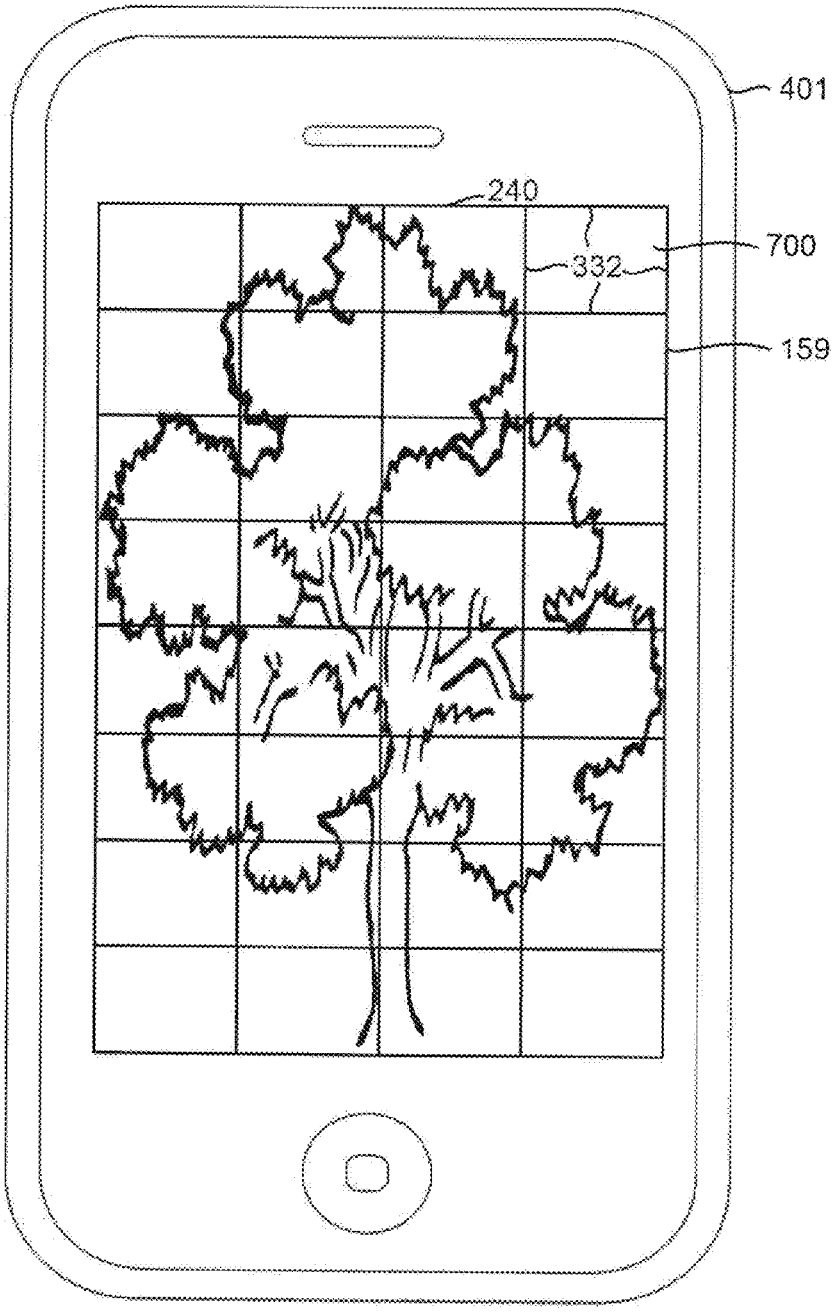

FIG. 7A

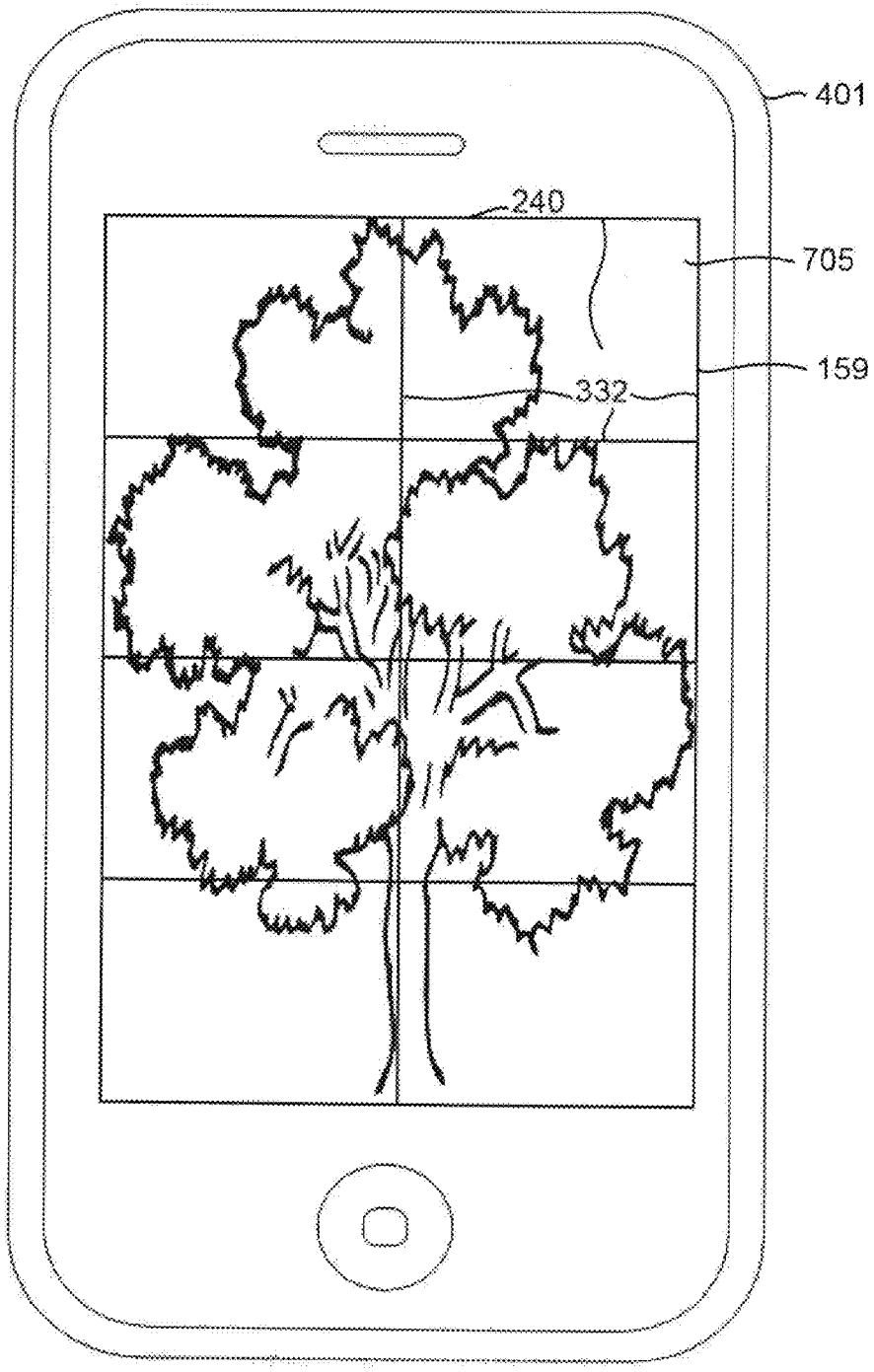

FIG. 7B

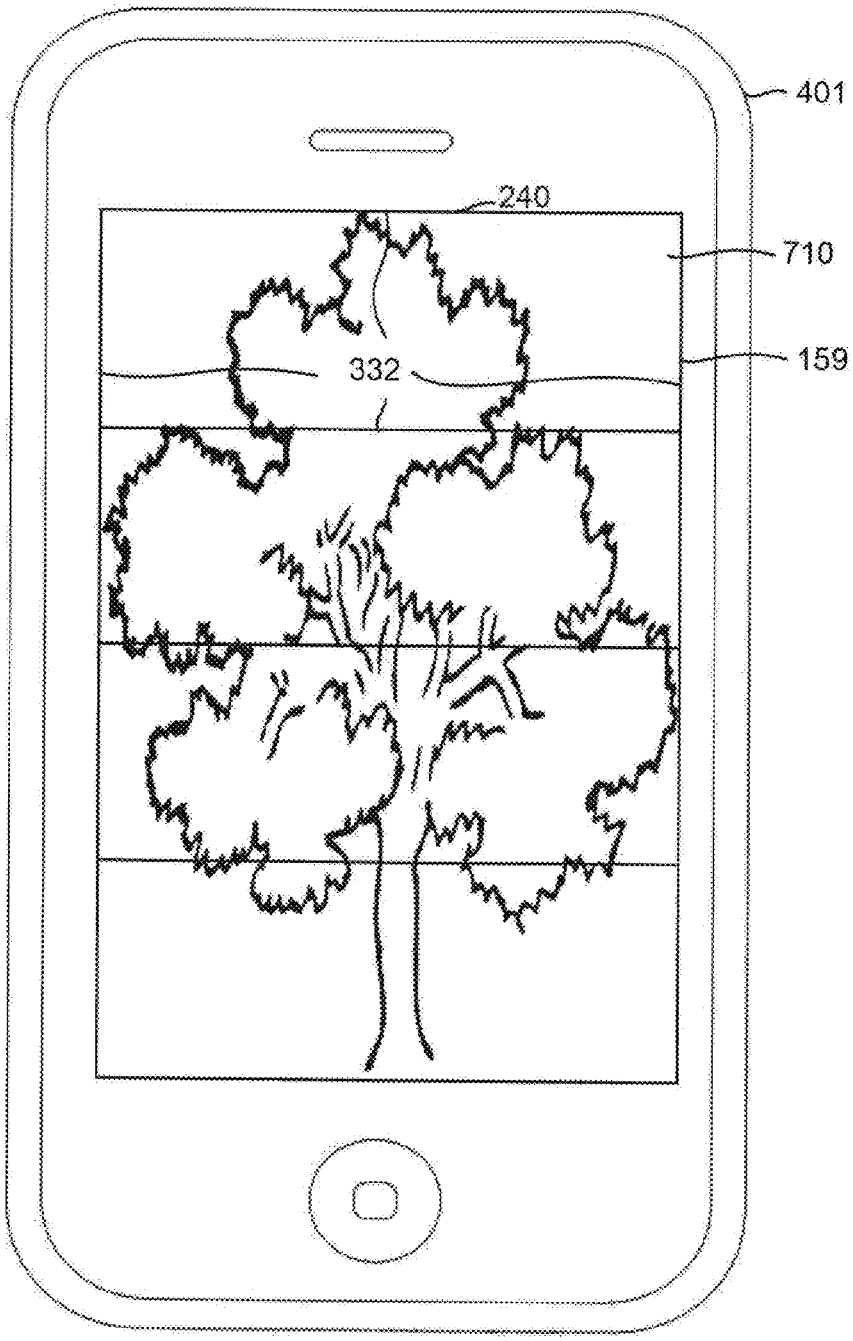

FIG. 7C

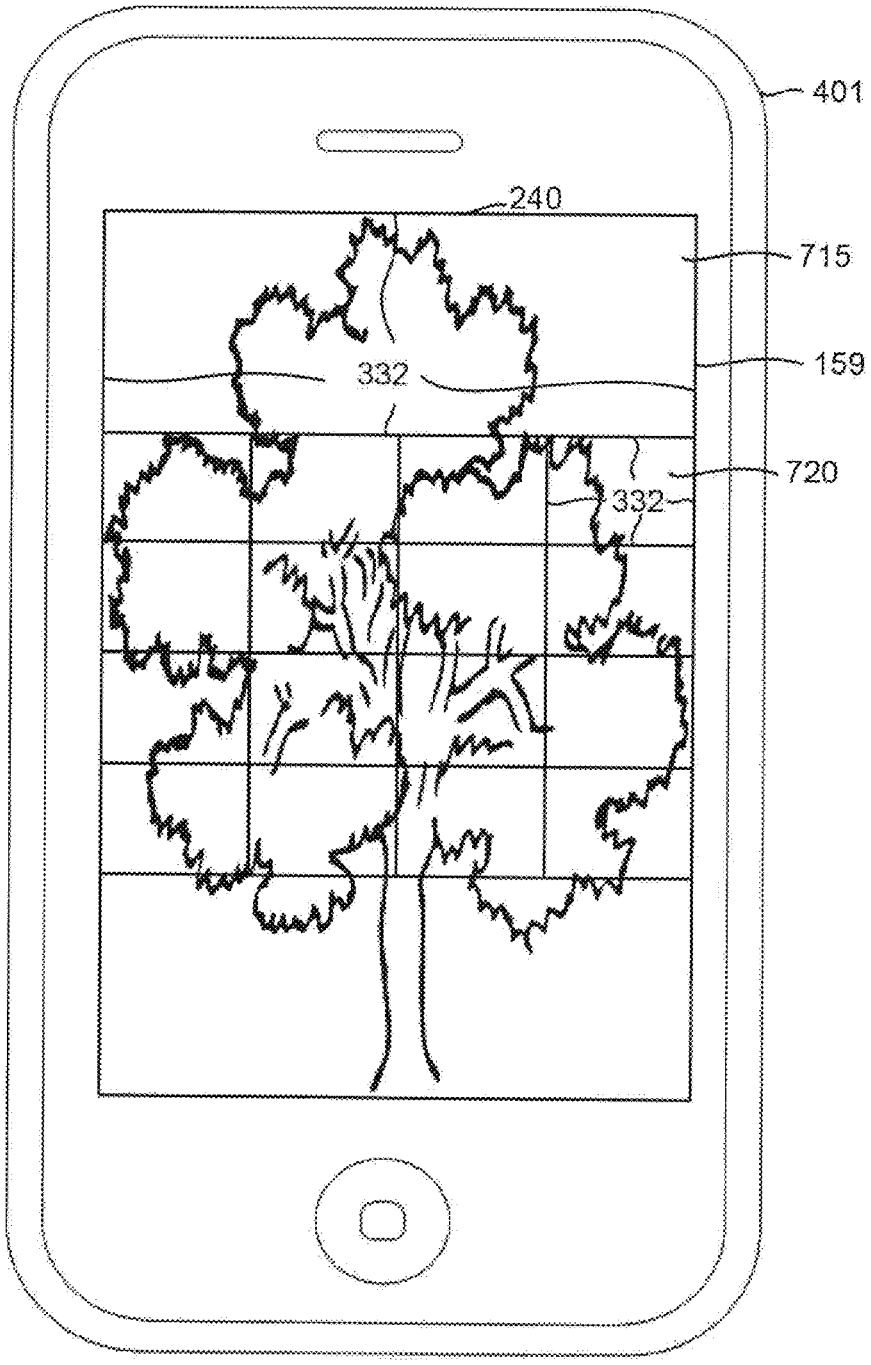

FIG. 7D

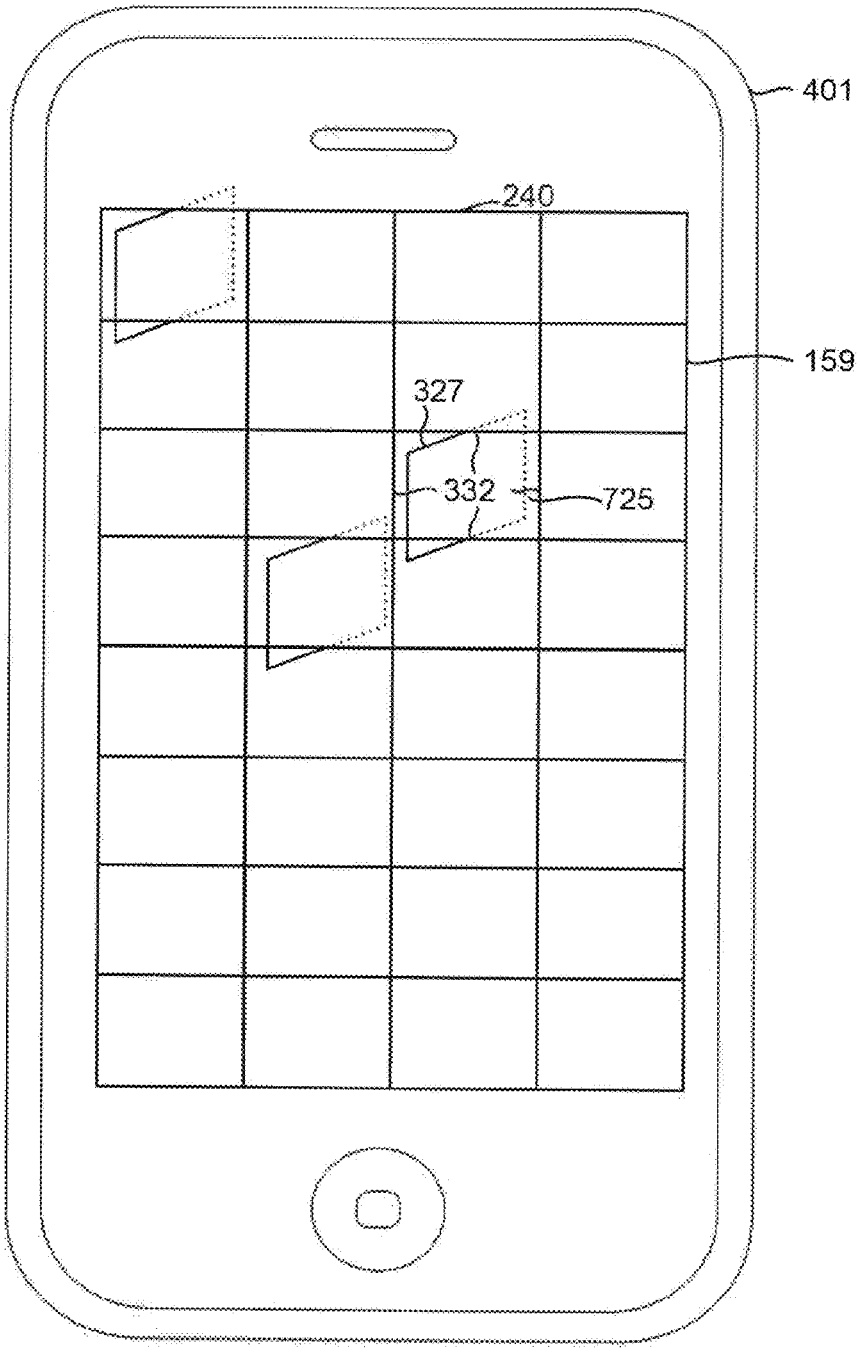

FIG. 7E

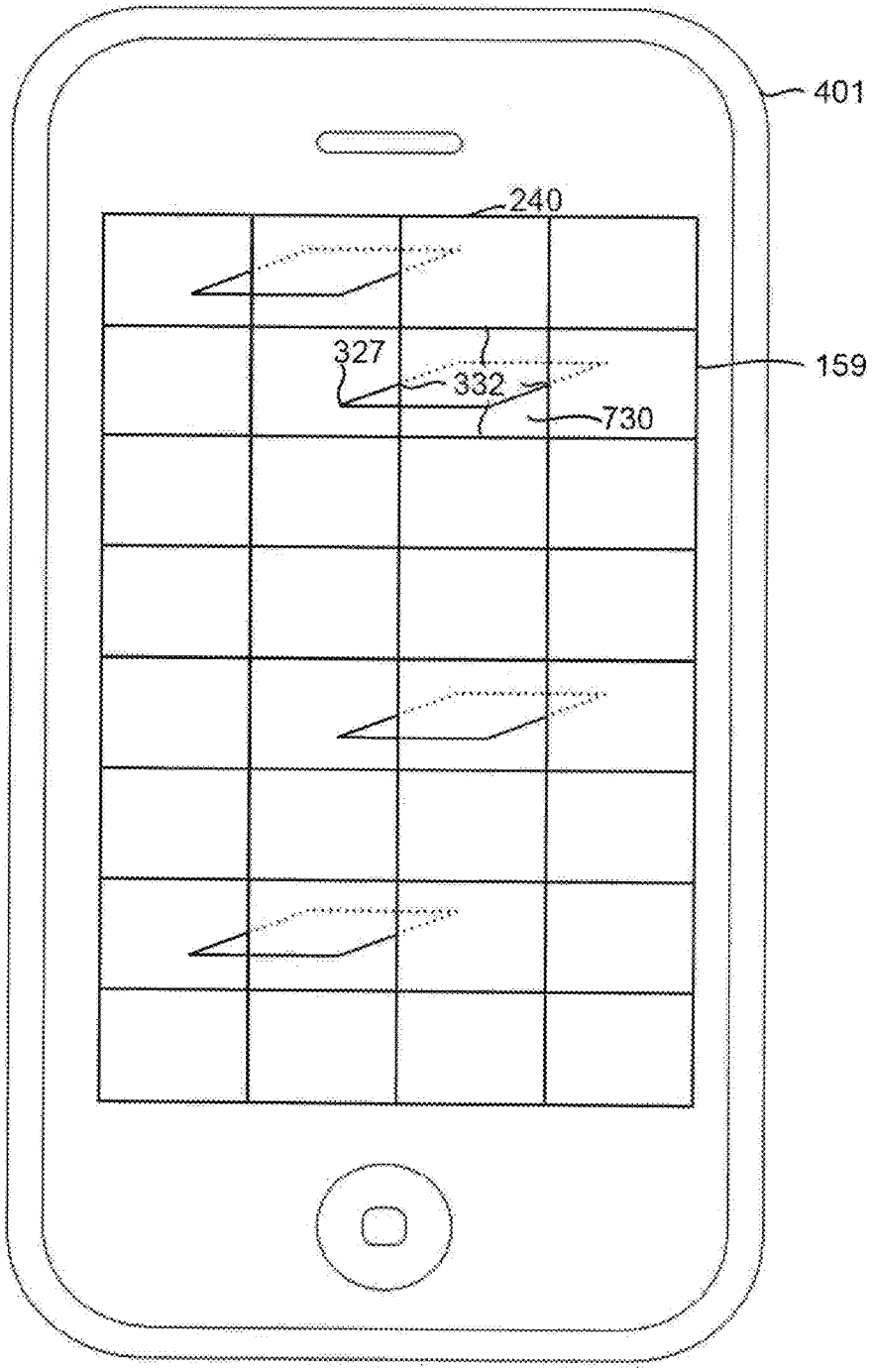

FIG. 7F

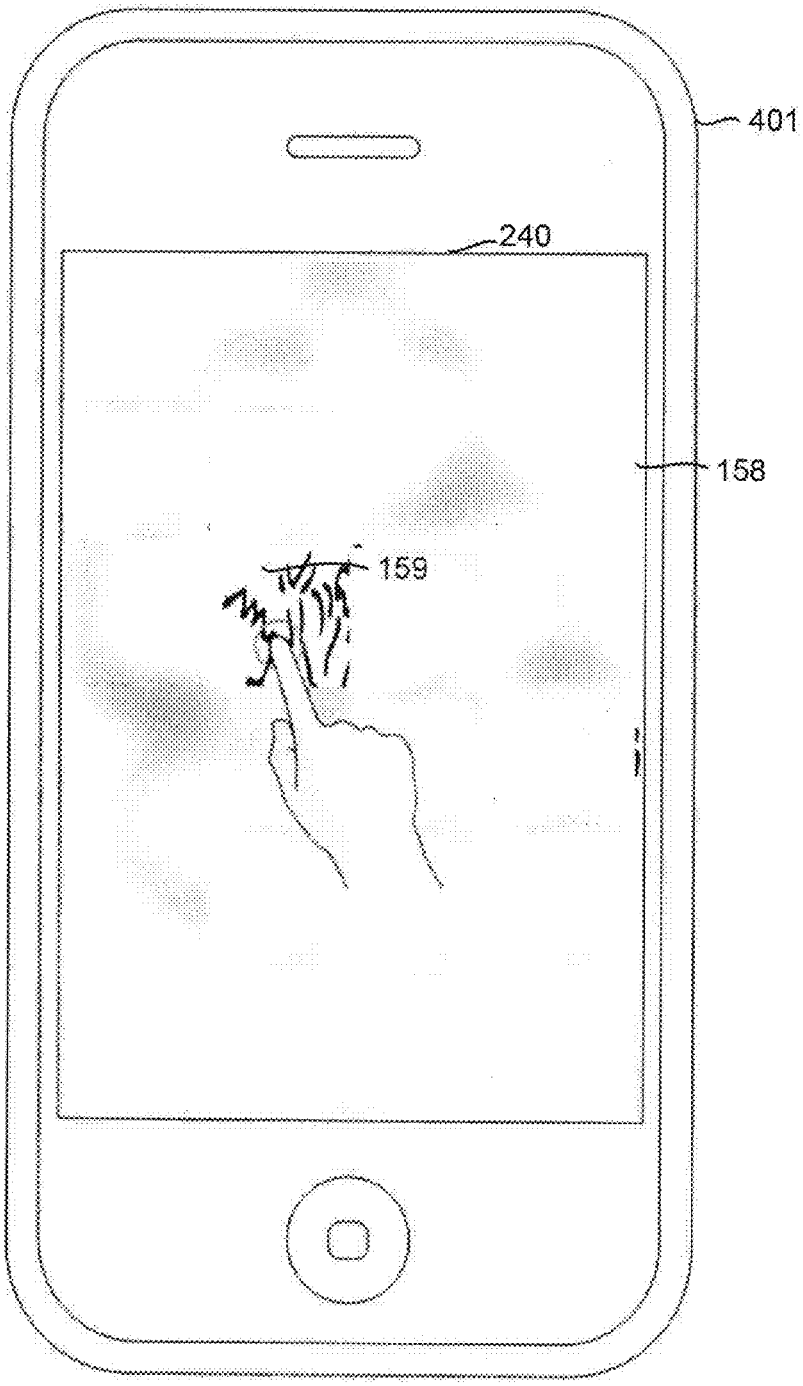

FIG. 7G

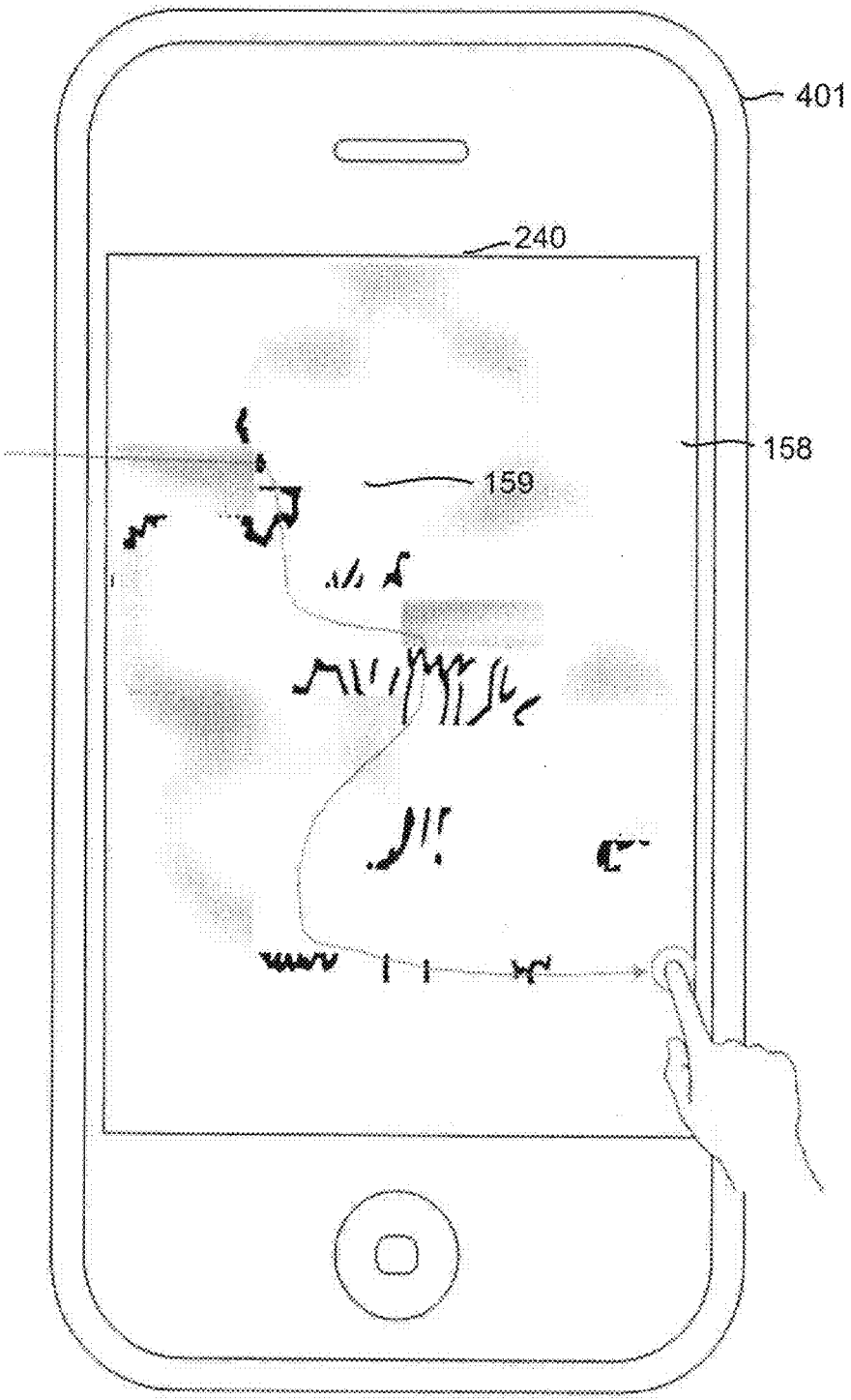

FIG. 7H

SYSTEMS, METHODS AND DEVICES FOR PROVIDING VISUAL PRIVACY TO MESSAGES

FIELD

The described, embodiments relate generally to systems and methods for providing visual privacy to messages.

BACKGROUND

Electronic messaging has become a primary mode of communication between parties. The growth in messaging services has been fueled by the increase in mobile electronic devices, such as smartphones, tablets, and the like. Messaging services provide users with the ability to transmit and receive content such as texts, images and videos from electronic devices.

Some messaging services have been created for transmitting and receiving sensitive or private content between its users. These messaging services employ techniques to limit traceability of messages distributed through the service, for example by employing self-destructing or vanishing messages. In this approach, records of the message or message content distributed through the service are removed from the receiver's electronic device and from the server managed by the messaging service once the message has been opened and read by the receiver.

Other messaging services attempt to mask the message content by limiting the receiver's ability to view the message or by restricting the receiver's ability to capture the message content. For example, some messaging services mask the message content in order to limit the receiver's ability to take a screenshot of the message content from their electronic device. These messaging services may blur or blacken the message content and employ a "peephole" or "spyhole", through which the receiver can view the message. This approach, however, has various limitations. For example, the receiver must continuously select an area on the screen of the electronic device with their finger in order to deploy the peephole. The accuracy of placing the peephole may vary depending on the size of the receiver's finger. Additionally, the size of the peephole limits the receiver to view only that portion of the message revealed by the peephole at any given time. This approach increases the amount of time required for a receiver to view message content.

Known messaging services for distributing sensitive or private content do not allow the sender to vary or influence the user experience of the receiver. For example, a sender may wish to send a message containing sensitive message content to various receivers. The sender may have a high degree of trust with some receivers of the message, and a low degree of trust with other receivers of the message. In this case, a sender may provide trusted receivers with a higher degree of latitude in viewing the message content, and less trusted receivers with a lower degree of latitude in viewing the message content.

In other instances, a sender may wish to vary specific portions of sensitive message content. For example, a sender transmitting banking information through the messaging service may wish to apply a higher degree of privacy to an account number contained in the message content, and a lower degree of privacy to the remainder of the message content.

Known messaging services for distributing sensitive or private message content may not permit the receiver of the message to increase the degree of visual privacy attributed to the message. For example, a trusted receiver may receive sensitive message content and may have been provided a high degree of latitude from the message sender. The receiver, however, may be in a crowded location (e.g., on a crowded train), and may wish to increase the degree of privacy attributed to the sensitive message content such that onlookers cannot easily view the sensitive message content displayed on the electronic device.

Some messaging services mask sensitive message content by applying an opaque or blurred layer on top of the content at the electronic device of the sender, or at the server managed by the messaging server. This approach, however, unnecessarily increases the data required to transmit and receive the message over a communication network.

SUMMARY

In a first aspect, some embodiments of the invention provide a method of providing visual privacy for a message sent to at least one device comprising receiving the message at the at least one device, where the message includes content and a privacy indicator, converting the content to a content image; applying a blur function to the content image to generate a blurred content image; partitioning the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes, aligning the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

In another broad aspect, the obscured layer comprises a first face and a second face, and wherein the first face and second face each comprise a front side and rear side.

In another broad aspect, the front side of the first face includes the blurred content image and the front side of the second face is a mirror image of the front side of the first face.

In another broad aspect, the obscured layer is generated by abutting the rear side of the first face with the rear side of the second face.

In another broad aspect, the privacy indicator is based on the blur function and segment attributes.

In another broad aspect, the blur function and the segment attributes are selectable by a sender of the message.

In another broad aspect, the privacy indicator can be modified by the receiver of the message.

In another broad aspect, the one or more segment attributes comprise at least one of: a rotational rate, a rotational axis, rotational duration, segment size, segment coordinates, segment shape, segment boundaries, obscured layer selection duration, obscured layer removal rate and obscured layer removal duration.

In another broad aspect, the rotational axis is selected from a group consisting of: a north-south axis, an east-west axis, a north-west and south-east axis, or a north-east and south west axis.

In another broad aspect, the blur function comprises a blur intensity and a blur filter.

In another broad aspect, the content is video content, and wherein only a frame of the video content is converted to the content image.

In another broad aspect, the blur filter is selected from a group consisting of a Gaussian blur, a spiral blur, a motion blur, or a pixelize blur.

In another broad aspect, some embodiments of the invention provide a device configured to receive a message, comprising: a memory configured to store a message that includes

content and a privacy indicator; and a processor configured to: convert the content to a content image; apply a blur function to the content image to generate a blurred content image; generate an obscured layer from the blurred content image; partition the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes; align the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

In another broad aspect, some embodiments of the invention provide a system of providing privacy for a message transmitted between devices using a communication network, the system comprising: a sender device configured to transmit the message, the message including content, a privacy indicator, and at least one receiver identifier; at least one server configured to: receive the message from the sender device, the message comprising content, a privacy indicator, and at least one receiver identifier; route the message from the sender device to the at least one receiver device based on the at least one receiver identifier; receive an acknowledgement receipt from the receiver device; at least one receiver device configured to: receive the message; transmit an acknowledgment receipt; convert the content to a content image; apply a blur function to the content image to generate a blurred content image; generate an obscured layer from the blurred content image; partition the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes; align the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention will now be described in detail with reference to the drawings, in which:

FIG. **1**A is a block diagram illustrating a messaging system for providing visual privacy in accordance with at least one example embodiment;

FIG. **1**B is a block diagram illustrating a messaging system for providing visual privacy in accordance with at least one example embodiment;

FIG. **1**C is a block diagram illustrating a message in accordance with at least one example embodiment;

FIG. **2** is a block diagram illustrating a device in accordance with at least one example embodiment;

FIG. **3** is a block diagram illustrating privacy indicator in accordance with at least one example embodiment;

FIG. **4** is a block diagram illustrating a messaging system in accordance with at least one example embodiment;

FIG. **5** is a block diagram illustrating a message on a device in accordance with at least one example embodiment;

FIG. **6** is a block diagram illustrating an obscured layer in accordance with at least one example embodiment;

FIG. **7**A is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**B is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**C is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**D is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**E is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**F is a block diagram illustrating a content layer in accordance with at least one example embodiment;

FIG. **7**G is a block diagram illustrating a content layer and an obscured layer in accordance with at least one example embodiment; and

FIG. **7**H is a block diagram illustrating a content layer and an obscured layer in accordance with at least one example embodiment.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

It will be appreciated that numerous specific details are set forth in order to provide a thorough understanding of the example embodiments described herein. However, it will be understood by those of ordinary skill in the art that the embodiments described herein may be practiced without these specific details. In other instances, well-known methods, procedures and components have not been described in detail so as not to obscure the embodiments described herein.

The embodiments of the systems and methods described herein may be implemented in hardware or software, or a combination of both. These embodiments may be implemented in computer programs executing on programmable computers, each computer including at least one processor, a data storage system (including volatile memory or non-volatile memory or other data storage elements or a combination thereof), and at least one communication interface. For example, and without limitation, the various programmable computers or electronic devices may be a server, network appliance, set-top box, embedded device, computer expansion module, personal computer, laptop, mobile telephone, smartphone or any other computing device capable of being configured to carry out the methods described herein.

Each program may be implemented in a high level procedural or object oriented programming or scripting language, or both, to communicate with a computer system. However, alternatively the programs may be implemented in assembly or machine language, if desired. The language may be a compiled or interpreted language. Each such computer program may be stored on a non-transitory computer readable storage medium (e.g. read-only memory, magnetic disk, optical disc). The storage medium so configured causes a computer to operate in a specific and predefined manner to perform the functions described herein.

While particular combinations of various functions and features are expressly described herein, other combinations of these features and functions are possible that are not limited by the particular examples disclosed herein, and these are expressly incorporated within the scope of the present invention.

The various embodiments described herein generally relate to systems and methods for providing visual privacy to messages. Messages refer generally to electronic messages transmitted and received over a communication network. Visual privacy generally refers to obscuring message content on the electronic device of the receiver. Messages generally comprise content, for example an image, text or video, and a privacy indicator. The privacy indicator corresponding to a message is based on a blur function and segment attributes. In some embodiments, the blur function and segment attributes are selectable by the sender of the message. In some embodiments, a sender may transmit a message to multiple recipients, where each recipient may have a different privacy indi-

cator. In other embodiments, the receiver can increase the visual privacy established by the sender of the message.

In some embodiments, the receiver may select an area of the display of the electronic device corresponding to one or more segments in order to reveal the message content for the one or more segments. The message content is revealed according to the segment attributes for the one or more segments.

In some embodiments, segments attributes can relate to the physical size and shape of the segment. In other embodiments, segment attributes can relate to a rotational rate, rotational axis, or a rotational duration of the segment. In yet other embodiments, segment attributes can relate to the duration in which the receiver selects an area on the display of the electronic device, or the rate or duration in which the message content is revealed.

The method of providing visual privacy to messages first converts the message content to an image. For example, message content comprising text message is converted to an image of the text. Message content comprising video converts a frame of the video to an image. A blur function is then applied to the image to generate a blurred content image. The blur function may include a blur filter and blur intensity. A blur filter includes, for example, a Gaussian-blur, pixelize-blur, spiral-blur, or motion-blur. Blur intensity generally relates to the pixel-radius scale, which can be varied in order to alter the intensity of the blur.

An obscured layer is generated from the blurred content image. In some embodiments, the obscured layer comprises two faces, a first face and a second face. In some embodiments the blurred content image is applied to the first face, and a mirror image of the blurred content image is applied to the second face.

Implementing a privacy indicator that is selectable by a sender of a message, as described in the following embodiments, may have several advantages. A sender of a message can influence and control the user experience for each receiver viewing the message content. A trusted receiver may have a higher degree of latitude in viewing the message content, whereas a less trusted receiver may have a lower degree of latitude in viewing the message content. Furthermore, implementing the privacy indicator at the receiver's electronic device reduces the amount of data required to transmit or receive the message over a communication network. Additionally, implementing an obscured layer that is removed based on segment attributes may have several advantages. For example, each segment can operate independently of other segments, allowing the sender to customize the viewing experience of the receiver. The receiver can select multiple segments concurrently to reveal multiple segments of the message content.

Reference is first made to FIG. **1**A, which illustrates system **100**A. System **100**A comprises a plurality of electronic devices **125***a*-**125***h*, messaging server **120**, and communication network **110**.

Electronic devices **125***a*-**125***h* (also referred herein as a device or devices) may include any electronic device comprising a touchscreen and capable of communication over a communications network, such as, cellular phones, smart phones, tablets, wireless organizers, personal digital assistants, computers, laptops, Internet appliances and the like.

Electronic device **125***a* represents a first electronic device, electronic device **125***b* represents a second electronic device, electronic device **125***c* represents a third electronic device, electronic device **125***d* represents a fourth electronic device, electronic device **125***e* represent a fifth electronic device, electronic device **125***f* represents a sixth electronic device, electronic device **125***g* represents a seventh electronic device, and electronic device **125***h* represents an n^{th} electronic device.

Messaging server **120** may include at least one computer server equipped with a processor and memory storing, for example, a database or file system and computer executable program code as described herein. Messaging server **120** is configured to route messages sent from a sender's electronic device to a receiver's electronic device via communication network **110**. A database on messaging server **120** may contain records for correlating a user account corresponding to the messaging service with a device identifier corresponding to the user's electronic device.

Communication network **110** connects electronic devices **125***a*-**125***h* to messaging server **120**. Communication network **110** may be any network or network components capable of carrying data including the Internet, Ethernet, plain old telephone service (POTS) line, public switch telephone network (PSTN), integrated services digital network (ISDN), digital subscriber line (DSL), coaxial cable, fiber optics, satellite, mobile, wireless (e.g. Wi-Fi, WIMAX), SS7 signaling network, fixed line, local area network (LAN), wide area network (WAN), a direct point-to-point connection, mobile data networks (e.g., Universal Mobile Telecommunications System (UMTS), 3GPP Long-Term Evolution Advanced (LTE Advanced), Worldwide Interoperability for Microwave Access (WiMAX), etc.), and others, including any combination of these.

Reference is next made to FIG. **1**B, which illustrates an example data flow of system **100**B. System **100**B comprises a sender's electronic device **125***a*, a receiver's electronic device **125***b*, messaging server **120** and communication network **110**.

In some embodiments, each user of the messaging service requires an account with the messaging service in order to transmit and receive messages. The account uses an identifier (herein after referred to as an account identifier), such as a username or email address to identify a user of the messaging service. For additional security, the messaging service may also require an image of the user's face to be associated with the account and stored on the electronic device. In some embodiments, the receiver of a message may be authenticated through facial recognition before gaining access to a received message. For example, the messaging service may continuously compare the image of the user's face associated with the account with the face of the user accessing the message.

Sender's electronic device **125***a* transmits a message **150***a* to a first receiver's electronic device **125***b*. The sender may address the receiver using the receiver's account identifier associated with the messaging service. Account identifiers may include a receiver's username for the messaging service, an email address, a personal identification number (PIN), or any other suitable identifier. Messaging server **120** routes the message **150***a* to the receiver's electronic device **125***b* by correlating the respective account identifier **165** and a device identifier associated with the receiver's electronic device. Device identifiers may include a mobile directory number (MDN), mobile identification number (MIN), international mobile subscriber number (IMSI), electronic serial number (ESN) or any other suitable identifier associated with an electronic device or a subscriber identity module (SIM).

Message **150***a* is received at the receiver's electronic device **125***b*. Message **150***a* may be encrypted at the sender's electronic device **125***a*, and decrypted by the receiver's electronic device **125***b*, (for example, using an encryption technique such as Data Encryption Standard (DES), Triple DES, or Advanced Encryption Standard (AES)). The message **150***a*

may comprise message content and a privacy indicator. Receiver electronic device **125***b* may transmit an acknowledgement **150***b* back the messaging server **120** indicating successful receipt of message **150***a*.

Reference is next made to FIG. **1**C, which illustrates an example embodiment of message **150***a*. Message **150***a* comprises message content **155** and privacy indicator **160**. Message content **155** includes any content such as a text **155***a*, and image **155***b*, or video **155***c*. Privacy indicator **160** is based on at least one segment attribute **325** and blur function **305**. In some embodiments, account identifier **165** may include, for example, a username **165***a* or an email address **165***b*. Account identifier **165** may comprise any suitable identifier that associates a user with the messaging service.

Reference is next made to FIG. **2**, which illustrates an example embodiment of an electronic device **225**. Electronic device **225** generally includes a number of components, in particular a processor **205**, memory **215** and communication subsystem **260**, a GPS module **210**, battery **255**, display **240**, keyboard **250**, speaker **230**, camera **235** and microphone **245**.

Communication subsystem **260** comprises a radio transmitter **261** and receiver **262** to send and receive data, respectively, and may comprise an antenna (not shown) for connecting to communication network **110**.

Memory **215** may store computer executable code in the form of programs or modules **220**, including a contacts module **221**, messaging module **222**, and operating system software (not shown) that allow the user of the electronic device to send and receive data. Memory **215** may be volatile memory (also referred to as temporary storage) or non-volatile memory.

GPS module **210** is a receiver for the Global Positioning System (or equivalent, such as GLONASS or Galileo), and is configured to provide navigation and geographical positioning data.

Processor **205** executes the computer executable code stored in memory **215** and generally interacts with the display **240**, keyboard **250**, speaker **230**, and microphone **245** to provide communication related functions, such as entering a message for delivery over the communication network **110** or program functions such as displaying the user's contacts. Keyboard **250** may comprise, for example, a physical buttons or a touchscreen keyboard for entering text. Display **240** may comprise any touchscreen technology, such as resistive, capacitive, or surface acoustic wave technology.

Speaker **230** may generate audio signals, for example, when the mobile device is used as a telephone handset. Microphone **245** may, for example, capture audio signals when the mobile device is used to record dictation or used to convert audio signals to electrical signals when the device is used as a telephone handset. Battery **255** may comprise, for example, a lithium ion battery for providing power to the mobile device. Camera **235** may be used to take pictures or to record video on the communication device. In some embodiments, camera **235** may be used for authenticating the identity of the receiver by continuously comparing the face image associated with the receiver's account with the face of the receiver accessing the message.

Reference is next made to FIG. **4**, which illustrates an example embodiment of system **100**B. System **100**B comprises a sender's electronic device **400** transmitting message **150***a* to a receiver's electronic device **401** over communication network **110**. Message **150***a* comprises message content **155**, privacy indicator **160**, and account identifier **165** corresponding to a user of the messaging service. Messaging server **120** receives message **150***a* from the sender's electronic device **400** and correlates the account identifier **165** with the device identifier corresponding to the receiver's electronic device **401**. As noted above, a device identifier may include a mobile directory number (MDN), mobile identification number (MIN), international mobile subscriber number (IMSI), electronic serial number (ESN) or the like. Messaging server **120** may contain a database stored on memory, wherein the database comprises at least two fields to correlate an account identifier **165** with a device identifier.

Message **150***a* is routed to the receiver's electronic device **401** by messaging server **120**. In this embodiment, message content **155** consists of an image **155***b*. When message content **155** is received by the receiver's electronic device, it is stored in an encrypted format in the temporary storage of the electronic device **401** and cannot be viewed or accessed by the receiver.

The receiver's electronic device **401** generates a content image from message content **155**. In some embodiments, the content image is generated by converting message content **155***a*-**155***c* into an image. For example, if message content **155** consists of text **155***a*, text **155***a* is converted into an image to generate a content image. If message content **155** consists of video **155***c*, a frame of video **155***c* is converted into an image to create a content image. If message content **155** is an image **155***b*, the image **155***b* is used as the content image.

The content layer is generated by partitioning the content image into one or more segments based on the segment attributes **325** of privacy indicator **300** at the receiver's electronic device **401**. The content layer is stored on temporary storage of the receiver's device, and cannot be viewed by the receiver. The co-ordinates and/or boundaries of the content layer **159** and each segment of the content layer **159** that correspond to an area of the display **240** are stored in the temporary storage of the receiver's electronic device **401**. Once the electronic message **150***a* has been accessed by the receiver, it cannot be re-accessed. In other words, once the electronic message **150***a* has been closed by the receiver, it is removed from the temporary storage on the electronic device

A blur function **305** is applied to content image to generate a blurred content image. The blurred content image is then used to generate an obscured layer **158**, which is stored as a separate image in temporary storage of the receiver's electronic device **401**. The obscured layer **158** is viewable on the display **240** of the receiver's electronic device **401**.

In some embodiments, the receiver must be signed into the messaging service with the account identifier and corresponding password in addition to being authenticated using facial recognition before gaining access to the message **150***a*. Facial recognition compares the receiver's face captured by camera **235** with an image of the receiver's face stored on the receiver's electronic device **401**. The image of the receiver's face may be stored on the device memory **215**.

Reference is next made to FIG. **5**, which illustrates an expanded view of the obscured layer **158** aligned with content layer **159** on display **240**. One or more coordinates and/or boundaries of the content layer **159** are stored on the temporary storage of the receiver's electronic device **401**. The coordinates and/or boundaries of the content layer **159** are used to correlate an area on display **240** corresponding to the one or more coordinates and/or boundaries of the content layer **159**. Such coordinates and/or boundaries are also used to align the obscured layer **158** with the content layer **159**, and correlate an area on the obscured layer **158** with a corresponding area on display **240**.

The uppermost edge of content layer **159** corresponds to the top boundary **405** of content layer **159**. The lowermost edge of content layer **159** corresponds to the bottom boundary **415** of content layer **159**. The leftmost edge of the content

layer **159** corresponds to the left boundary **420** and the rightmost edge of the content layer **159** corresponds to the right boundary **410** of the content layer **159**.

Similarly the uppermost edge of obscured layer **158** corresponds to the top boundary **505** of obscured layer **159**. The lowermost edge of the obscured layer **158** corresponds to the bottom boundary **515** of obscured layer **158**. The leftmost edge of obscured layer **158** corresponds to the left boundary **520** of obscured layer **158**, and the rightmost edge of obscured layer **158** corresponds to the right boundary **510** of obscured layer **158**.

In some embodiments, the obscured layer **158** is aligned with the content layer **159** by aligning one or more corresponding boundaries. For example, the top boundary **505** on the obscured layer is aligned with the top boundary **405** of the content layer **159**. The bottom boundary **515** of the obscured layer **158** is aligned with the bottom boundary **415** of the content layer **159**. The left and right boundaries, **520** and **510**, of the obscured layer **158** are aligned with the left and right boundaries, **420** and **410**, of the content layer **159** respectively.

In other embodiments, the one or more coordinates and/or boundaries can be used to align obscured layer **158** with the content layer **159**. For example, coordinate **425** corresponds to the center point of content layer **159**, and coordinate **525** corresponds to the center point of obscured layer **158**. The obscured layer **158** can be aligned with the content layer **159** by aligning the center coordinate **525** of obscured layer **158** with the center coordinate **425** of content layer **159**.

Reference is next made to FIG. **6**, which illustrates an expanded view of the obscured layer **158**. The obscured layer **158** comprises a first face **160** and a second face **170**. The first face comprises a front side **161** and a rear side **162**. Similarly, the second face comprises a front side **171** and a rear side **172**. In some embodiments, the front side **161** of the first face **160** consists of the blurred content image **157**, and the rear side **172** of the second face **170** consists of a mirror image of the front side **161** of the first face **160**. In other embodiments, the front side **161** of the first face **160** and rear side **171** of the second face may each comprise an opaque image. The obscured layer **158** is generated by abutting the rear side **162** of the first face **160** with the rear side **172** of the second face **170**.

Reference is now made to FIG. **3**, which illustrates an example embodiment of a privacy indicator **300**. Privacy indicator **300** is based on a blur function **305** and at least one segment attribute **325**. Blur function **305** includes a blur filter **306** and blur intensity **315**. Examples of a blur filter **305** include a Gaussian blur **307**, spiral blur **308**, motion blur **309**, pixelize blur **310**, or any other suitable blur filter. Each blur filter creates a different visual effect by manipulating the content image.

For example, a motion blur **309** creates a sense of motion that may be linear, radial, or rotational. A pixelize blur **310** creates a blur effect by transforming the message content into a plurality of large square pixels. A spiral blur **308** creates a blur effect that appears to center towards a focal point of the image. A Gaussian blur **307** creates a blur effect that appears as though the image is viewed through a translucent screen.

The blur intensity **315** can be altered by varying the pixel radius **316** between values of 1-100. Increasing the pixel radius **316** increases the number of surrounding or overlapping pixels that each pixel utilizes to increase blur intensity. A first range **317** of pixel radius is between 1-19, a second range **318** of pixel radius is between 20-39, a third range **319** of pixel radius is between 40-59, a fourth range **320** of pixel radius is between 60-79, and a fifth range **321** of pixel radius is between 80-100.

Segment attributes **325** are selectable by the sender of the message. Segment attributes **325** allow the sender to vary the user experience of the receiver of the message. Example segment attributes include rotational rate **326**, rotational axis **327**, rotational duration **328**, segment size **329**, segment coordinates **330**, segment shape **331**, segment boundaries **332**, obscured layer selection duration **333**, obscured layer removal rate **334**, and obscured layer removal duration **335**.

Segment size **329** permits the sender to vary segment size, for example, as large, medium, or small segments. A small segment size partitions the content layer **159** into a higher number of segments, providing a higher degree of visual privacy. A large segment size partitions the content layer **159** into a lower number of segments, providing a lower degree of visual privacy.

Segment coordinates **330** generally relate to the position of the segment on the content layer **159** and accordingly the segment position on display **240**. Segment coordinates **330** allow the sender to specify the position of each segment based on a coordinate. For example, specifying segment coordinate **330** as (0,0) positions the segment at the center of the content layer **159** and accordingly, at the center of display **240**.

Similar to segment coordinates **330**, segment boundaries **332** also relate to the segment position on the content layer **159**, and accordingly the segment position on the display **240**. Segment boundaries **332** allow the sender to specify the position of each segment based on one or more segment boundaries. For example, a sender may specify the uppermost and left segment boundaries **332** to correspond to the uppermost and left content layer **159** boundary.

Segment shape **331** generally relates to the geometric shape of the segment. Examples of a segment shape **331** include a square, rectangle, circle, hexagon, octagon, etc.

Rotational rate **326** refers to the number of revolutions per unit of time (e.g., revolutions per second) of an area on the obscured layer corresponding to one or more segments selected by the receiver on display **240**. A higher rotational rate limits the receiver's ability to view content layer **159**. The area on the obscured layer **158** corresponding to the one or more segments selected by the receiver on display **240** rotates at the specified rotational rate **326**, which limits the amount of time the content layer **159** is viewable to the receiver for that segment. Conversely, a lower rotational rate **326** increases the amount of time the segment of the content layer **159** is viewable by the receiver. Rotational rates **326** can be specified by the sender as a specific rate, for example, as two revolutions per second.

Alternatively, the rotational rate **326** can be categorized as high, medium, or low. A low rotational rate **326** may include a range between 1-10 revolutions per second, a medium rotational rate may include a range between 11-20 revolutions per second, and a high rotational rate **326** may include a range between 21-30 revolutions per second.

Rotational axis **327** generally refers to the axis upon which the area on the obscured layer corresponding to one or more segments selected by the receiver on display **240** rotates. For example, rotational axis **327** may include a north-south axis, an east-west axis, a north-west and south-east axis, and a north-east and south-west axis.

Rotational duration **328** generally refers to the length of time the area on the obscured layer corresponding to one or more segments selected by the receiver on display **240** rotates. Rotational duration **328** can be specified in any unit of time, such as, milliseconds, seconds, or minutes. The sender

can select a shorter rotational duration **328** to rotate the area on the obscured layer corresponding to one or more selected segments for a shorter length of time, thereby increasing the visual privacy provided to message **150***a*. Conversely, the sender may select a longer rotational duration **328** to reduce the visual privacy provided to message **150***a*, for example, for a trusted receiver.

Obscured layer selection duration **333** generally refers to the length of time an area on the obscured layer **168** corresponding to one or more segments of content layer **159** is selected on display **240**. In some embodiments, obscured layer selection duration **333** may be specified in units of time, for example, milliseconds, seconds, or minutes. In other embodiments, obscured layer selection duration **333** may be specified as continuous, where the area on the obscured layer **158** corresponding to one or more segments of content layer **159** is continuously selected on display **240**.

Obscured layer removal rate **334** generally refers to the rate at which the obscured layer is removed when an area on the obscured layer **158** corresponding to one or more segments of content layer **159** is selected on display **240**. For example, the obscured layer removal rate **334** may be specified as a numerical value between 0 and 10, where increasing the numerical value increases the rate in which the obscured layer **158** is removed when the area on the obscured layer **158** corresponding to one or more segments of content layer **159** is selected on display **240**. For example a sender may wish to set the obscured layer removal rate **334** as zero for one or more segments, in which case the obscured layer **158** is not removed when the area on the obscured layer **158** corresponding to one or more segments of content layer **159** is selected on display **240**.

Obscured layer removal duration **335** generally refers to the length of time an area on the obscured layer **158** corresponding to one or more segments of content layer **159** is removed. Obscured layer removal duration **335** can be specified in any unit of time, such as, milliseconds, seconds, or minutes.

The sender can select a shorter obscured layer removal duration **335** to remove the area on the obscured layer corresponding to one or more selected segments for a shorter length of time, thereby increasing the visual privacy provided to message **150***a*. Conversely, the sender may select a longer obscured layer removal duration **335** to reduce the visual privacy provided to message **150***a*, for example, for a trusted receiver.

Each of the segment attributes **325** noted above may be implemented alone or in combination allowing the sender to vary the user experience of the receiver viewing a message. Each segment has one or more segment attributes, and can operate independently of one another.

Reference is next made to FIG. **7**A, which illustrates an example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **700** has the following segment attributes **325**: segment size **329** is set as small, segment shape **331** is set as rectangle, and four segment boundaries **332**.

Reference is made to FIG. **7**B, which illustrates another example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **705** has the following segment attributes **325**: segment size **329** is set as medium, segment shape **331** is set as rectangle, and four segment boundaries **332**.

Reference is made to FIG. **7**C, which illustrates another example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **710** has the following segment attributes **325**: segment size **329** is set as large, segment shape **331** is set as rectangle, and four segment boundaries **332**.

Reference is made to FIG. **7**D, which illustrates another example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **715** has the following segment attributes **325**: segment size **329** is set as large, segment shape **331** is set as rectangle, and four segment boundaries **332**. Segment **720** has the following segment attributes **325**: segment size **329** is set as small, segment shape **331** is set as rectangle, and four segment boundaries **332**.

Reference is made to FIG. **7**E, which illustrates another example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **725** has the following segment attributes **325**: segment size **329** is set as small, segment shape **331** is set as rectangle, four segment boundaries **332**, and rotational axis **327** is set as north-south.

Reference is made to FIG. **7**F, which illustrates another example embodiment of content layer **159** and one or more segments each having at least one segment attribute **325**. In this example embodiment segment **730** has the following segment attributes **325**: segment size **329** is set as small, segment shape **331** is set as rectangle, four segment boundaries **332**, and rotational axis **327** is set as east-west.

Reference is next made to FIG. **7**G, which illustrates an example embodiment of an area on the obscured layer **158** being removed when the area on the obscured layer **158** corresponding to one or more segments of content layer **159** is selected on display **240**. In this embodiment, some of the segment attributes **325** include: segment size **329** set to small; segment shape set to square; obscured layer selection duration **333** set to continuous; and the obscured layer removal rate **334** set to 5.

Reference is next made to FIG. **7**H, which illustrates an example embodiment of an area on the obscured layer **158** being removed when an area on the obscured layer **158** corresponding to one or more segments of content layer **159** is selected on display **240**. In this embodiment, some of the segment attributes **325** include: segment size **329** set to small; segment shape set to square; rotational axis **327** set to east-west; and rotational rate **326** set to ten revolutions per second.

In some embodiments, a receiver may wish to increase the visual privacy of an electronic message **150***a*. For example, a sender may select segment size **329** as large, rotational rate **326** as one revolution per second. The receiver of the electronic message **150***a* may be in a crowded location and may wish a higher degree of visual privacy. The receiver may change the segment size **329** to small and set the rotational rate **326** to ten revolutions per second.

The present invention has been described here by way of example only. Various modification and variations may be made to these exemplary embodiments without departing from the spirit and scope of the invention, which is limited only by the appended claims.

The invention claimed is:

1. A method of providing visual privacy for a message sent to at least one device, the method comprising:

receiving the message at the at least one device, the message including content and a privacy indicator;

converting the content to a content image;

applying a blur function to the content image to generate a blurred content image;

generating an obscured layer from the blurred content image;

partitioning the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes;

aligning the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

2. The method of claim **1**, wherein the obscured layer comprises a first face and a second face, and wherein the first face and second face each comprise a front side and rear side.

3. The method of claim **2**, wherein the front side of the first face includes the blurred content image and the front side of the second face is a mirror image of the front side of the first face.

4. The method of claim **3**, wherein the obscured layer is generated by abutting the rear side of the first face with the rear side of the second face.

5. The method of claim **1**, wherein the privacy indicator is based on the blur function and segment attributes.

6. The method of claim **1**, wherein the blur function and the segment attributes are selectable by a sender of the message.

7. The method of claim **1**, wherein the privacy indicator can be modified by the receiver of the message.

8. The method of claim **1**, wherein the one or more segment attributes comprise at least one of: a rotational rate, a rotational axis, rotational duration, segment size, segment coordinates, segment shape, segment boundaries, obscured layer selection duration, obscured layer removal rate and obscured layer removal duration.

9. The method of claim **8**, wherein the rotational axis is selected from a group consisting of: a north-south axis, an east-west axis, a north-west and south-east axis, or a north-east and south west axis.

10. The method of claim **1**, wherein the blur function comprises a blur intensity and a blur filter.

11. The method of claim **1**, wherein the content is video content, and wherein only a frame of the video content is converted to the content image.

12. The method of claim **1**, wherein the blur filter is selected from a group consisting of: a Gaussian blur, a spiral blur, a motion blur, or a pixelize blur.

13. A device configured to receive a message, comprising:

a memory configured to store a message that includes content and a privacy indicator; and

a processor configured to:

convert the content to a content image;

apply a blur function to the content image to generate a blurred content image;

generate an obscured layer from the blurred content image;

partition the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes;

align the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

14. The device of claim **13**, wherein the obscured layer comprises a first face and a second face, and wherein the first face and second face each comprise a front side and rear side.

15. The device of claim **14**, wherein the front side of the first face includes the blurred content image and the front side of the second face is a mirror image of the front side of the first face.

16. The device of claim **15**, wherein the obscured layer is generated by abutting the rear side of the first face with the rear side of the second face.

17. The device of claim **13**, wherein the privacy indicator is based on the blur function and segment attributes.

18. The device of claim **13**, wherein the privacy indicator is selectable by a sender of the message.

19. The device of claim **13**, wherein the privacy indicator can be modified by the receiver of the message.

20. A system of providing privacy for a message transmitted between devices using a communication network, the system comprising:

a sender device configured to transmit the message, the message including content, a privacy indicator, and at least one account identifier;

at least one server configured to:

receive the message from the sender device, the message comprising content, a privacy indicator, and at least one account identifier;

route the message from the sender device to the at least one receiver device based on the at least one account identifier;

receive an acknowledgement receipt from the receiver device;

at least one receiver device configured to:

receive the message;

transmit an acknowledgment receipt;

convert the content to a content image;

apply a blur function to the content image to generate a blurred content image;

generate an obscured layer from the blurred content image;

partition the content image into one or more segments to generate a content layer, the one or more segments each having one or more segment attributes;

align the obscured layer with the content layer, wherein selecting an area on the obscured layer corresponding to the one or more segments removes the obscured layer for the one or more segments based on the one or more segment attributes.

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